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2025
ISSUE

The Role of Integrated Solutions in Industrial Electrification

Delta-Q

In the rapidly evolving landscape of industrial electrification, system integration plays a crucial role in enhancing the efficiency and cost-effectiveness of non-road mobile machinery (NRMM). It is essential to understand the importance of:

- An integrated solution
- The trade-offs between flexibility and cost-effectiveness
- The value of strategic partnerships with system integrators

By grasping these key aspects, OEMs can make informed decisions to develop sustainable, future-ready systems.

Defining Integrated Solutions in Industrial Electrification

“Integration” refers to systems in which multiple components are designed to function seamlessly within a unified architecture. In the context of charging solutions, a fully integrated system might encapsulate key components, including:

- On-board chargers
- AC export power
- DC-DC converters
- Electric vehicle supply equipment (EVSE) interfaces

This approach contrasts with discrete systems, where each component operates independently and requires manual interconnection.

Why Integration Matters

For electrified NRMM, integrated systems represent the industry's ideal solution. By leveraging advancements in communication protocols and component design, integrated systems achieve synergistic benefits otherwise unattainable in traditional combustion engine powered machinery. Electrified NRMM operating on an integrated platform demonstrates remarkably improved efficiency and cost-effectiveness, all in a more compact package.

Analyzing the Trade-Offs: Flexibility vs. Cost-Effectiveness

Despite the advantages, integration may impose unintended limitations. The primary trade-offs can be summarized by comparing flexibility and cost-effectiveness:

- Flexibility – Integrated systems can be less adaptable. Upgrading a single component often necessitates redesigning interconnected elements, increasing downtime and costs compared to modular, discrete systems.
- Cost-Effectiveness – Integrated solutions reduce production costs and shift development risks to suppliers, generally lowering the cost of initial investments. In contrast, discrete systems demand greater upfront integration efforts since OEMs must source components from parallel markets.

These trade-offs are not new. Lessons from mature markets demonstrate that electrified products naturally trend toward integrated solutions. OEMs leveraging such cross-industry insights position themselves to strike the ideal balance for their unique vertical and application.

Consulting with System Integrators for a Balanced Solution

System integration is crucial for optimizing the performance and efficiency of electrified machinery. Integrated solutions, such as on-board chargers, EVSE compatibility, and digitalized fleet management, offer significant advantages over discrete components. These include improved

battery efficiency, safety, and lifespan, as well as enhanced diagnostics, optimized charging schedules, and intelligent workflows.

However, integration also presents challenges, such as the rigidity of component-level upgrades and the need for precise coordination. To navigate the complexities—and unlock the benefits of electrification, OEMs can benefit greatly from collaborating with experienced system integrators.

The right partners bring expertise in developing solutions that combine the best aspects of integration and modularity, enabling OEMs to:

- Reduce development risks by delegating integration to suppliers and third parties
- Future-proof designs to accommodate emerging standards and innovations
- Ensure component compatibility and optimization across diverse systems

Achieving Sustainable, Future-Ready Systems

As industries continue to embrace electrification, the importance of strategically integrated solutions will only grow.

While integration offers undeniable benefits, OEMs must carefully navigate trade-offs between flexibility and cost-effectiveness to create sustainable, future-ready systems.

Partnering with trusted system integrators allows OEM development teams to strike this balance. These partnerships provide the expertise and cross-industry insights needed to fuel competitively designed solutions.

About Rod Dayrit

Rod Dayrit is the Global Director of Business Development for ZAPI GROUP charging solutions. Dayrit joined the ZAPI GROUP initially working for Delta-Q Technologies in 2018 and has more than 25 years of experience with design and development in the electrical field. Throughout his time with Delta-Q, he has informed global growth strategies and spearheaded the creation and launch of the company's compatibility program, "Charged by Delta-Q." Prior to joining Delta-Q, he held senior sales and business development roles at Samsung SDI, Foxlink and Motorola. ■



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